

# SYMBOLIC COMPUTATION

## Natural Language Communication

with Pictorial  
Information Systems

Edited by Leonard Bolc



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# Symbolic Computation Natural Language Communication With Pictorial Information Systems

**D. Navinchandra**



## **Symbolic Computation Natural Language Communication With Pictorial Information Systems:**

**Natural Language Communication with Pictorial Information Systems** Leonard Bolc, 2012-12-06 This book contains the reports of selected projects involving natural language communication with pictorial information systems. More than just a record of research results, however, it presents concrete applications to the solution of a wide variety of problems. The authors are all prominent figures in the field whose authoritative contributions help ensure its continued expansion in both size and significance. Y. C. Lee and K. S. Fu, Purdue University, USA, survey picture query languages which form an interface between the pictorial database system and the user and support information retrieval, data entry and manipulation, data analysis and output generation. They include explicit picture query languages that augment alphanumeric data query languages as well as languages and command sets which are implicitly embedded in a pictorial information system but perform similar functions. It is worth mentioning that some forms of query languages can be transformed from a given set of natural language sentences by using ATN (Augmented Transition Networks) which consequently allows for natural language communication with information systems.

**Pictorial Information Systems in Medicine** Karl H. Höhne, 2013-06-29 This volume contains the proceedings of the NATO Advanced Study Institute on Pictorial Information Systems in Medicine held August 27 - September 7, 1984, in Hotel Maritim Braunlage, Harz, Federal Republic of Germany. The program committee of the institute consisted of K. H. Höhne (Director), G. T. Herman, G. S. Lodwick and D. Meyer-Ebrecht. The organization was in the hands of Klaus Assmann and Fritz Bocker. In the last decade, medical imaging has undergone a rapid development. New imaging modalities such as Computer Tomography (CT), Digital Angiography (DSA) and Magnetic Resonance Imaging (MRI) were developed using the capabilities of modern computers. In a modern hospital, these technologies produce already more than 25% of image data in digital form. This format lends itself to the design of computer-assisted information systems. Integrating data acquisition, presentation, communication and archiving for all modalities and users within a department or even a hospital. Advantages such as rapid access to any archived image, synoptic presentation, computer-assisted image analysis, to name only a few, are expected. The design of such pictorial information systems, however, often called PACS (Picture Archiving and Communication Systems), in the medical community is a non-trivial task involving know-how from many disciplines such as Medicine, especially Radiology, Database Technology, Computer Graphics, Man-Machine Interaction, Hardware Technology and others. Most of these disciplines are represented by disjunct scientific communities.

**Natural Language Understanding and Cognitive Robotics** Masao Yokota, 2019-12-06 In the not so distant future, we can expect a world where humans and robots coexist and interact with each other. For this to occur, we need to understand human traits such as seeing, hearing, thinking, speaking, etc., and institute these traits in robots. The most essential feature necessary for robots to achieve is that of integrative multimedia understanding (IMU) which occurs naturally in humans. It allows us to assimilate pieces of information expressed through different modes such as speech, pictures, gestures, etc. The book describes how robots acquire traits like

natural language understanding NLU as the central part of IMU Mental image directed semantic theory MIDST is its core and is based on the hypothesis that NLU is essentially the processing of mental image associated with natural language expressions namely mental image based understanding MBU MIDST is intended to model omnisensory mental image in human and to afford a knowledge representation system in order for integrative management of knowledge subjective to cognitive mechanisms of intelligent entities such as humans and robots based on a mental image model visualized as Loci in Attribute Spaces and its description language Lmd mental image description language to be employed for predicate logic with a systematic scheme for symbol grounding This language works as an interlingua among various kinds of information media and has been applied to several versions of the intelligent system interlingual understanding model aiming at general system IMAGES Its latest version i e conversation management system CMS simulates MBU and comprehends the user's intention through dialogue to find and solve problems and finally provides a response in text or animation The book is aimed at researchers and students interested in artificial intelligence robotics and cognitive science Based on philosophical considerations the methodology will also have an appeal in linguistics psychology ontology geography and cartography Key Features Describes the methodology to provide robots with human like capability of natural language understanding NLU as the central part of IMU Uses methodology that also relates to linguistics psychology ontology geography and cartography Examines current trends in machine translation

**Visual Languages** Shi-Kuo Chang, 2012-12-06 This book is intended as both an introduction to the state of the art in visual languages as well as an exposition of the frontiers of research in advanced visual languages It is for computer scientists computer engineers information scientists application programmers and technical managers responsible for software development projects who are interested in the methodology and manifold applications of visual languages and visual programming The contents of this book are drawn from invited papers as well as selected papers from two workshops the 1985 IEEE Workshop on Languages for Automation Cognitive Aspects in Information Processing which was held in Mallorca Spain June 28-30 1985 and the 1984 IEEE Workshop on Visual Languages which was held in Hiroshima Japan December 7-9 1984 Panos Ligomenides and I organized the technical program of LFA 85 and Tadao Ichikawa and I organized the technical program of VL 84 Both workshops have now become successful annual events in their own right The intersecting area of visual languages and visual programming especially has become a fascinating new research area It is hoped that this book will focus the reader's attention on some of the interesting research issues as well as the potential for future applications After reading this book the reader will undoubtedly get an impression that visual languages and the concept of generalized icons can be studied fruitfully from many different perspectives including computer graphics formal language theory educational methodology cognitive psychology and visual design

Computation of Language Roland Hausser, 2012-12-06 The study of linguistics has been forever changed by the advent of the computer Not only does the machine permit the processing of enormous quantities of text thereby securing a better

empirical foundation for conclusions but also since it is a modelling device the machine allows the implementation of theories of grammar and other kinds of language processing Models can have very unexpected properties both good and bad and it is only through extensive tests that the value of a model can be properly assessed The computer revolution has been going on for many years and its importance for linguistics was recognized early on but the more recent spread of personal workstations has made it a reality that can no longer be ignored by anyone in the subject The present essay in particular could never have been written without the aid of the computer I know personally from conversations and consultations with the author over many months how the book has changed If he did not have at his command a powerful typesetting program he would not have been able to see how his writing looked and exactly how it had to be revised and amplified Even more significant for the evolution of the linguistic theory is the easy testing of examples made possible by the implementation of the parser and the computer held lexicon Indeed the rule set and lexicon grew substantially after the successes of the early implementations created the desire to incorporate more linguistic phenomena

Catalogue of Artificial Intelligence Techniques Alan Smaill, Alan Bundy, 2012-12-06 The purpose of the Catalogue of Artificial Intelligence Techniques is to promote interaction between members of the AI community It does this by announcing the existence of AI techniques and acting as a pointer into the literature Thus the AI community will have access to a common extensional definition of the field which will promote a common terminology discourage the reinvention of wheels and act as a clearing house for ideas and algorithms The catalogue is a reference work providing a quick guide to the AI techniques available for different jobs It is not intended to be a textbook like the Artificial Intelligence Handbook Intentionally it only provides a brief description of each technique with no extended discussion of its historical origin or how it has been used in particular AI programs The original version of the catalogue was hastily built in 1983 as part of the UK SERC DoI IKBS Architecture Study It was adopted by the UK Alvey Programme and during the life of the programme was both circulated to Alvey grant holders in hard copy form and maintained as an on line document A version designed for the international community was published as a paperback by Springer Verlag All these versions have undergone constant revision and refinement Springer Verlag has agreed to reprint the catalogue at frequent intervals in order to keep it up to date and this is the third edition of their paperback version

Natural Language Communication with Pictorial Information Systems Leonard Bolc, 1984-05-01 *An Introduction to Default Logic* Philippe Besnard, 2013-04-17 This book is written for those who are interested in a formalization of human reasoning especially in order to build intelligent computer systems Thus it is mainly designed for the Artificial Intelligence community both students and researchers although it can be useful for people working in related fields like cognitive psychology The major theme is not Artificial Intelligence applications although these are discussed throughout in sketch form Rather the book places a heavy emphasis on the formal development of default logic results and problems Default logic provides a formalism for an important part of human reasoning Default logic is specifically concerned with common sense

reasoning which has recently been recognized in the Artificial Intelligence literature to be of fundamental importance for knowledge representation. Previously formalized reasoning systems failed in real world environments though succeeding with an acceptable ratio in well defined environments. This situation enabled empirical explorations and the design of systems without theoretical justification. In particular they could not be compared since there was no basis to judge their respective merits. Default logic turned out to be very fruitful by proving the correctness of some of them. We hope that this book will initiate other successful developments in default logic.

**User Models in Dialog Systems** Alfred Kobsa, Wolfgang Wahlster, 2012-12-06 User models have recently attracted much research interest in the field of artificial intelligence dialog systems. It has become evident that flexible user oriented dialog behavior of such systems can be achieved only if the system has access to a model of the user containing assumptions about his/her background knowledge as well as his/her goals and plans in consulting the system. Research in the field of user models investigates how such assumptions can be automatically created, represented and exploited by the system in the course of an on line interaction with the user. The communication medium in this interaction need not necessarily be a natural language such as English or German. Formal interaction languages are also permitted. The emphasis is placed on systems with natural language input and output. However, a dozen major and several more minor user modeling systems have been designed and implemented in the last decade mostly in the context of natural language dialog systems. The goal of UM86, the first international workshop on user modeling, was to bring together the researchers working on these projects so that results could be discussed and analyzed and hopefully general insights be found that could prove useful for future research. The meeting took place in Maria Laach, a small village some 40 miles south of Bonn, West Germany. 25 prominent researchers were invited to participate.

**Uncertainty and Vagueness in Knowledge Based Systems** Rudolf Kruse, Erhard Schwecke, Jochen Heinsohn, 2012-12-06 The primary aim of this monograph is to provide a formal framework for the representation and management of uncertainty and vagueness in the field of artificial intelligence. It puts particular emphasis on a thorough analysis of these phenomena and on the development of sound mathematical modeling approaches. Beyond this theoretical basis, the scope of the book includes also implementational aspects and a valuation of existing models and systems. The fundamental ambition of this book is to show that vagueness and uncertainty can be handled adequately by using measure theoretic methods. The presentation of applicable knowledge representation formalisms and reasoning algorithms substantiates the claim that efficiency requirements do not necessarily require renunciation of an uncompromising mathematical modeling. These results are used to evaluate systems based on probabilistic methods as well as on non standard concepts such as certainty factors, fuzzy sets or belief functions. The book is intended to be self contained and addresses researchers and practitioners in the field of knowledge based systems. It is in particular suitable as a textbook for graduate level students in AI, operations research and applied probability. A solid mathematical background is necessary for reading this book. Essential parts of the material have

been the subject of courses given by the first author for students of computer science and mathematics held since 1984 at the University in Braunschweig      Talking with Computers in Natural Language Eduard V. Popov,1986-08 Intended for a wide circle of specialists in automated systems Above all however it is intended for those who work on systems for communicating with machines      Prolog by Example Helder Coelho,Jose C. Cotta,2012-12-06 Prolog has a declarative style A predicate definition includes both the input and output parameters and it allows a programmer to define a desired result without being concerned about the detailed instructions of how it is to be computed Such a declarative language offers a solution to the software crisis because it is shorter and more concise more powerful and understandable than present day languages Logic highlights novel aspects of programming namely using the same program to compute a relation and its inverse and supporting deductive retrieval of information This is a book about using Prolog Its real point is the examples introduced from Chapter 3 onwards and so a Prolog programmer does not need to read Chapters 1 and 2 which are oriented more to teachers and to students respectively The book is recommended for introductory and advanced university courses where students may need to remember the basics about logic programming and Prolog before starting doing Chapters 1 and 2 were also kept for the sake of unity of the whole material In Chapter 1 a teaching strategy is explained based on the key concepts of Prolog which are novel aspects of programming Prolog is enhanced as a computer programming language used for solving problems that involve objects and the relationships between objects This chapter provides a pedagogical tour of prescriptions for the organization of Prolog programs by pointing out the main drawbacks novices may encounter

**Parallel Algorithms for Machine Intelligence and Vision** Vipin Kumar,P.S. Gopalakrishnan,Laveen N. Kanal,2012-12-06 Recent research results in the area of parallel algorithms for problem solving search natural language parsing and computer vision are brought together in this book The research reported demonstrates that substantial parallelism can be exploited in various machine intelligence and vision problems The chapter authors are prominent researchers actively involved in the study of parallel algorithms for machine intelligence and vision Extensive experimental studies are presented that will help the reader in assessing the usefulness of an approach to a specific problem Intended for students and researchers actively involved in parallel algorithms design and in machine intelligence and vision this book will serve as a valuable reference work as well as an introduction to several research directions in these areas      **Exploration and Innovation in Design** D. Navinchandra,2012-12-06 Exploration and Innovation in Design is one of the first books to present both conceptual and computational models of processes which have the potential to produce innovative results at early stages of design Discussed here is the concept of exploration where the system using computational processes moves outside predefined available decisions Sections of this volume discuss areas such as design representation and search exploration and the emergence of new criteria and precedent based adaptation In addition the author presents the overall architecture of a design system and shows how the pieces fit together into one coherent system Concluding chapters of the

book discuss relationships of work in design to other research efforts applications and future research directions in design The ideas and processes presented in this volume further our understanding of computational models of design particularly those that are capable of assisting in the production of non routine designs and affirm that we are indeed moving toward a science of design

**A Theory of Heuristic Information in Game-Tree Search** Chun-Hung Tzeng, 2012-12-06 Searching is an important process in most AI systems especially in those AI production systems consisting of a global database a set of production rules and a control system Because of the intractability of uninformed search procedures the use of heuristic information is necessary in most searching processes of AI systems This important concept of heuristic information is the central topic of this book We first use the 8 puzzle and the game tic tac toe noughts and crosses as examples to help our discussion The 8 puzzle consists of eight numbered movable tiles set in a 3 x 3 frame One cell of the frame is empty so that it is possible to move an adjacent numbered tile into the empty cell Given two tile configurations initial and goal an 8 puzzle problem consists of changing the initial configuration into the goal configuration as illustrated in Fig 1 1 A solution to this problem is a sequence of moves leading from the initial configuration to the goal configuration and an optimal solution is a solution having the smallest number of moves Not all problems have solutions for example in Fig 1 1 Problem 1 has many solutions while Problem 2 has no solution at all

*Expert System Applications* Leonard Bolc, Michael J. Coombs, 2012-12-06 While expert systems technology originated in the United States its development has become an international concern Since the start of the DENDRAL project at Stanford University over 15 years ago with its objective of problem solving via the automation of actual human expert knowledge significant expert systems projects have been completed in countries ranging from Japan to France Spain to China This book presents a sample of five such projects along with four substantial reports of mature studies from North American researchers Two important issues of expert system design permeate the papers in this volume The first concerns the incorporation of substantial numeric knowledge into a system This has become a significant focus of work as researchers have sought to apply expert systems technology to complex real world domains already subject to statistical or algebraic description and handled well at some level in numeric terms A second prominent issue is that of representing control knowledge in a manner which is both explicit and thus available for inspection and compatible with the semantics of the problem domain

**Foundations of Logic Programming** John W. Lloyd, 2012-12-06 In the two and a half years since the first edition of this book was published the field of logic programming has grown rapidly Consequently it seemed advisable to try to expand the subject matter covered in the first edition The new material in the second edition has a strong database flavour which reflects my own research interests over the last three years However despite the fact that the second edition has about 70% more material than the first edition many worthwhile topics are still missing I can only plead that the field is now too big to expect one author to cover everything In the second edition I discuss a larger class of programs than that discussed in the first edition Related to this I have also taken the opportunity to try to improve some of



the earlier terminology Firstly I introduce program statements which are formulas of the form  $A \rightarrow W$  where the head  $A$  is an atom and the body  $W$  is an arbitrary formula A program is a finite set of program statements There are various restrictions of this class Normal programs are ones where the body of each program statement is a conjunction of literals The terminology general used in the first edition is obviously now inappropriate

*Abductive Inference Models for Diagnostic Problem-Solving* Yun Peng, James A. Reggia, 2012-12-06 Making a diagnosis when something goes wrong with a natural or man made system can be difficult In many fields such as medicine or electronics a long training period and apprenticeship are required to become a skilled diagnostician During this time a novice diagnostician is asked to assimilate a large amount of knowledge about the class of systems to be diagnosed In contrast the novice is not really taught how to reason with this knowledge in arriving at a conclusion or a diagnosis except perhaps implicitly through case examples This would seem to indicate that many of the essential aspects of diagnostic reasoning are a type of intuition based common sense reasoning More precisely diagnostic reasoning can be classified as a type of inference known as abductive reasoning or abduction Abduction is defined to be a process of generating a plausible explanation for a given set of observations or facts Although mentioned in Aristotle's work the study of formal aspects of abduction did not really start until about a century ago

*Catalogue of Artificial Intelligence Tools* Alan Bundy, 2012-12-06 The purpose of this catalogue is to promote interaction between members of the AI community It will do this by announcing the existence of AI techniques and portable software and acting as a pointer into the literature Thus the AI community will have access to a common extensional definition of the field which will promote a common terminology discourage the reinvention of wheels and act as a clearing house for ideas and software The catalogue is a reference work providing a quick guide to the AI tools available for different jobs It is not intended to be a textbook like the Artificial Intelligence Handbook It intentionally only provides a brief description of each tool with no extended discussion of the historical origin of the tool or how it has been used in particular AI programs The focus is on techniques abstracted from their historical origins The original version of the catalogue was hastily built in 1983 as part of the UK SERC DoI IKBS Architecture Study It has now been adopted by the UK Alvey Programme and is both kept as an online document undergoing constant revision and refinement and published as a paperback by Springer Verlag Springer Verlag have agreed to reprint the Catalogue at frequent intervals in order to keep it up to date

**Computer Algebra J.** Calmet, 1982-10-08

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